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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,311	02/24/2004	Chiaki Aoyama	23085-08884	3431
758 7590 07/25/2007 FENWICK & WEST LLP SILICON VALLEY CENTER 801 CALIFORNIA STREET MOUNTAIN VIEW, CA 94041			EXAMINER OLSEN, LIN B	
			ART UNIT 3609	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/786,311

Applicant(s)

AOYAMA, CHIAKI

Examiner

Lin B. Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-5 and 10-11 is/are rejected.
- 7) ☐ Claim(s) 6-9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 6/1/04, 7/14/04
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities:

Figure 12 is present but not mentioned in the Brief Description of the Drawings.

On Page 13, the paragraph starting at line 15, 34R and 34L are referred to as elbow joints, while in the paragraphs starting at lines 24 and 30, they are referred to as knee joints. A reference number may only refer to one part of the invention.

On Page 14, line 6 reference numbers 41 and 42 are referred to as "neck ankles," these are neck joints.

On Page 16, lines 8 – 10, the sentence is incomplete – the robot grasps the position of what?

Page 32, lines 31- 32 refer to 1 – 3 processes to be determined. On Page 33, 5 processes are described.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims **1-4, and 10-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over PENG, Jian et al., "An Active Vision System for Mobile Robots," Systems, AMN. And Cybernetics, 2000, IEEE International Conference on Nashville, TN, USA, October 8- " 11. 2000. Piscataway. NJ. USA. IEEE. U.S. Vol. 2. Pgs. 1472-1477 (hereafter referred to as Peng) in view of KUNIYOSHI Y. et al., "A Humanoid Vision System for Versatile Interaction," Lecture Notes in Computer Science, Vol. 1811, Springer~ Germany, January 2000 (200-01), Pgs. 512-526 (hereafter referred to as Kuniyoshi). Peng describes a mobile robot that uses two independently panning cameras to mimic the binocular active vision of the human eye. Peng's robot uses color cues to find a target and then processes the digital images to track the target. The cameras in Peng are equipped with standard lenses rather than applicant's non-central projection lenses. Kuniyoshi describes a vision system for a robot that also uses an active vision system. The dual cameras in Kuniyoshi are equipped with wide angle lenses to provide a wider field of view than the system in Peng.

Regarding **claim 1**, "An automatic work apparatus which detects spatial position of targets based on images thereof taken by means of plural observing camera devices

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that have lenses of non-central projection” reads on Peng’s implementation of a robot with a head having two color cameras mounted on two independent pan-tilt heads, Peng, page 1472, abstract. Peng does not describe using a non-central projection lens on these cameras, but Kuniyoshi implements a binocular active vision system with foveated wide angle lenses, page 512 last sentence of abstract. This system is further described on page 515, in section 3 first 2 ¶s. While applicant suggests “such as fisheye lenses set therein” – this is only an example and a foveated wide angle lens also has a non-central projection. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the wide angle lens of Kuniyoshi into Peng’s system because robotic researchers strive to imitate human functions, and the eye is one of the most complicated and precise organs in the human body, Peng 2<sup>nd</sup> ¶ of Intro, page 1472. Detection of the spatial position of targets is mentioned in Peng at page 1473, 1<sup>st</sup> ¶ of Active Vision System Behaviors. “[A]nd carries out predetermined tasks,” reads on the robot head smoothly tracking the moving target and following the target as it moves, Peng, page 1472, last sentence of abstract. “a rotation device to change viewing direction of said observing camera devices;” reads on Peng’s pan-tilt units that support the cameras, page 1473, 1<sup>st</sup> ¶ of Hardware configuration. “a target image extracting unit to extract said targets in said images taken by means of said plural observing camera devices” reads on the fact that Peng detects a target, page 1473, 1<sup>st</sup> ¶ of Active Vision System Behaviors. “a rotation controller to control said rotation device in accordance with a certainty obtained by discriminating the target position information in response to target position that is specified by said target image extracting unit for

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each of said images of said targets” reads on Peng’s smooth pursuit module that continues to track an object at moderate speed to keep it in focus Page 1473, 1<sup>st</sup> ¶ of Active Vision System Behaviors and discussion of VOR behavior, page 1475, 1<sup>st</sup> ¶ of VOR.

Regarding **claim 2**, “An automatic work apparatus which specifies spatial position of targets based on images thereof taken by means of plural observing camera devices that have lenses of non-central projection such as fisheye lenses set therein and carries out predetermined tasks comprising: a rotation device to change viewing direction of said observing camera devices; a target image extracting unit to extract said targets in said images taken by means of said plural observing camera devices” reads on the sections of Peng as referenced relative to claim 1. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the wide angle lens of Kuniyoshi to extend the range of observation. “a position determining unit to determine said-spatial positions of said targets by using image positions of said targets specified by said target image extracting unit” reads on the description of using two neural nets to detect the position of the target, Peng, page 1474, ¶ under Figure 2. “a rotation controller to control said rotation device so that said rotation device changes viewing direction of said observing camera devices which take images, wherein at least two areas as a peripheral area and a central area are assigned to said images, of said targets in said central area in case that image positions of said targets specified by said target image extracting unit are in said peripheral area” reads on the description of smooth pursuit where three zones are defined in the image plane and no head motion is

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needed when the target is in the dead zone, smooth pursuit is possible while the target is in the fovea area, and the saccade module is used to bring the target back into focus when the target is outside the fovea area, Peng, 1474 ¶ at top of 2<sup>nd</sup> column.

Regarding **claim 3** which depends on claim 2, "a[n] transfer equipment to change relative distance with said targets so that said predetermined tasks are carried out by adjusting relative position against said target on a basis of spatial positions of said targets determined by said position determining unit" reads on Peng's VOR unit keeping the robot moving toward the target while maintaining both left and right cameras on the target, page 1475, ¶ beneath Fig 7.

Regarding **claim 4** which depends on claim 2, "said target image extracting unit has a function to extract said targets from said images taken by means of plural observing camera devices by specifying only picture elements that correspond to a reference color which is assigned for said targets and memorized for identifying said targets beforehand" reads on Peng's description of the object –following experiment where a color model was used to find a target, page 1476, ¶ after VI Experimental Results.

Regarding independent **claim 10**, "An automatic work control program apparatus that, in order to control an automatic work apparatus that comprises plural observing camera devices that have lenses of non-central projection such as fisheye lenses, to change directions of said observing camera device and to carry out predetermined tasks for said target on a basis of information obtained by images taken by said plural observing cameras systems" describes the system as described in Claims

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1 and 2 and is rejected based on the same sections of the references that are combined for the same reasons. "has a computer functioning for a purpose of means of target image extracting unit to extract said targets in said images taken by means of said observing camera devices" reads on the computers controlling the robot (Peng page 1473, 2<sup>nd</sup> ¶ in 1<sup>st</sup> column) actions in detecting targets as described on Peng, page 1473 1<sup>st</sup> ¶ under Active Vision System Behaviors. "a computer functioning for a purpose of means of rotational control of the rotational drive unit to control said rotational drive unit in accordance with a certainty of positional information obtained by discriminating said target position information regarding said target in response to said target position that is specified in each image by said target image extracting unit" reads on the computers controlling the head and cameras of the robot in Peng to track the target as moderate speed via the smooth pursuit module, page 1473, 3<sup>rd</sup> sentence of 1<sup>st</sup> ¶ under Active Vision System Behaviors.

Regarding independent **claim 11**, "An automatic work control program apparatus that, in order to control an automatic work apparatus that comprises plural observing camera devices that have lenses of non-central projection such as fisheye lenses, to change directions of said observing camera device and to carry out predetermined tasks for said target on a basis of information obtained by images taken by said plural observing cameras systems, has a computer functioning for a purpose of means of target image extracting unit to extract said targets in said images taken by means of said observing camera devices" describes the system as described in Claims 1 and 2 and is rejected based on the same sections of the references that are combined for the



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same reasons. "a purpose of means of position evaluation to obtain the target spatial position information in response to said target position that is specified in images by said target image extracting unit" reads on the description of using two neural nets to detect the position of the target, Peng, page 1474, ¶ under Figure 2. "a purpose of means of rotation controller to control said rotation device so that said rotation device changes viewing direction of said observing camera devices which take images, wherein at least two areas as a peripheral area and a central area are assigned to said images taken by said observing camera devices, so that said images of said targets are taken in said central area by said observing camera devices in case that image positions of said targets specified by said target image extracting unit is in said peripheral area, reads on the description of smooth pursuit where three zones are defined in the image plane and no head motion is needed when the target is in the dead zone, smooth pursuit is possible while the target is in the fovea area, and the saccade module is used to bring the target back into focus when the target is outside the fovea area, Peng, 1474 ¶ at top of 2<sup>nd</sup> column.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeng and Kuniyoshi as applied to claims 1 and 2 above and further in view of Tatsuno, Kyoichi, "A Beach Ball Volley Playing Robot with a Human", International Journal of the Robotics Society of Japan, No. 5, Vol. 18, pp. 105-111 (2000) (hereafter referred to as Tatsuno). Tatsuno describes extending the visual capabilities of a robot to interact with humans by batting a ball back and forth.

Regarding **claim 5**, which depends on claim 4, "said extracted target image by said target image extracting unit is labeled with a single same ID onto plural picture elements which keep a connectivity thereover so that said plural picture elements specify said target" reads on the 2<sup>nd</sup> ¶ of section 5.1 of Tatsuno, where the process of identifying the image is detailed and a labeling processor is described. The labeling processor evaluates the connectivity of the color of adjacent pixels and uses identical labels for the same color. Both Jeng and Kuniyoshi were interested in extending the visual acuity of a robot. It would have been obvious to one of ordinary skill in the art at the time of the invention to use Tatsuno's labeling process in identifying the head and arms as detailed in Kuniyoshi at page 524, the paragraph under figure 11 to improve the processing of that data.

#### ***Allowable Subject Matter***

Claims 6 – 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

**Claim 6** recites in part to determine an identification of the targets specified by composites of said picture elements that correspond to a reference color, which is assigned for said targets with said targets on a basis of predetermined aspect value after computing an aspect ratio of planer expansion of said picture elements. None of the cited art teaches or suggests using aspect ratio in this way.

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**Claim 7** recites in part to determine an identification of said targets specified by composures of said picture elements that correspond to a reference color which is assigned for said targets with said targets on a basis of predetermined filling rate of said composures of said picture elements against a rectangular given by a vertical viewing angle and a horizontal viewing angle in a viewing angle mapping specified by said images taken by means of plural observing camera devices. None of the cited art teaches or suggests using the filling rate of a rectangle defined in this way to identify a target.

**Claim 8** recites in part, images taken by means of plural observing camera devices are sampled with respect to colors and said reference color which is assigned for said targets is determined by eliminating a color of which area expands from the origin of Cr-Cb space chart after plotting said sampled color onto Cr-Cb space. None of the cited references teach or suggest excluding the area that expands from the origin of the Cr-Cb space chart in sampling for a color match.

**Claim 9** recites in part, a robot having two observing camera devices set in right hand side and left hand side thereof, wherein; said position determining unit comprises a distance computing module that determines distance to said target therefrom using position information of said target image specified by said target image extracting unit, a horizontal position computing module that computes horizontal position to said target using position information of said target image specified by said target image extracting unit and a vertical position computing module that computes vertical position to said target using position information of said target image specified by said target image

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extracting unit, three categories of areas as a left or right peripheral area, an upper or lower peripheral area and a central area are set for each image taken by said observing camera device. The cited prior art does not teach or suggest having the target image extracting unit dividing the target image into those three categories of areas.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure; U.S. Patent No. 6,853,880 for pattern recognition based on color,; "Vision for Mobile Robot Navigation; A Survey" for background of the state of the art, and "Movie Video Hypermedia Authoring System" for using filling rate to identify a character.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lin B. Olsen whose telephone number is 571-272-9754. The examiner can normally be reached on M-F, 7:30am-5:00pm EST, Alternate Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian T. Pendleton can be reached on 571-272-7527. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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BRIAN TYRONE PENDLETON  
SUPERVISORY PATENT EXAMINER